



# **EOSDIS**

NASA'S EARTH OBSERVING SYSTEM  
DATA AND INFORMATION SYSTEM

# **Guided Tour of Pythonian Museum**

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The HDF Group

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# Welcome to Pythonian Mesum!



[https://commons.wikimedia.org/wiki/File:Smithsonian\\_Building\\_NR.jpg](https://commons.wikimedia.org/wiki/File:Smithsonian_Building_NR.jpg)

# Your tour guide

- is the maintainer of [hdfeos.org](http://hdfeos.org) website.
- loves *diverse* NASA HDF products.
- has created 170+ Python examples so far.

# Where is the museum?

<http://hdfeos.org/zoo>

Let's  
Go!



# The Main Entrance

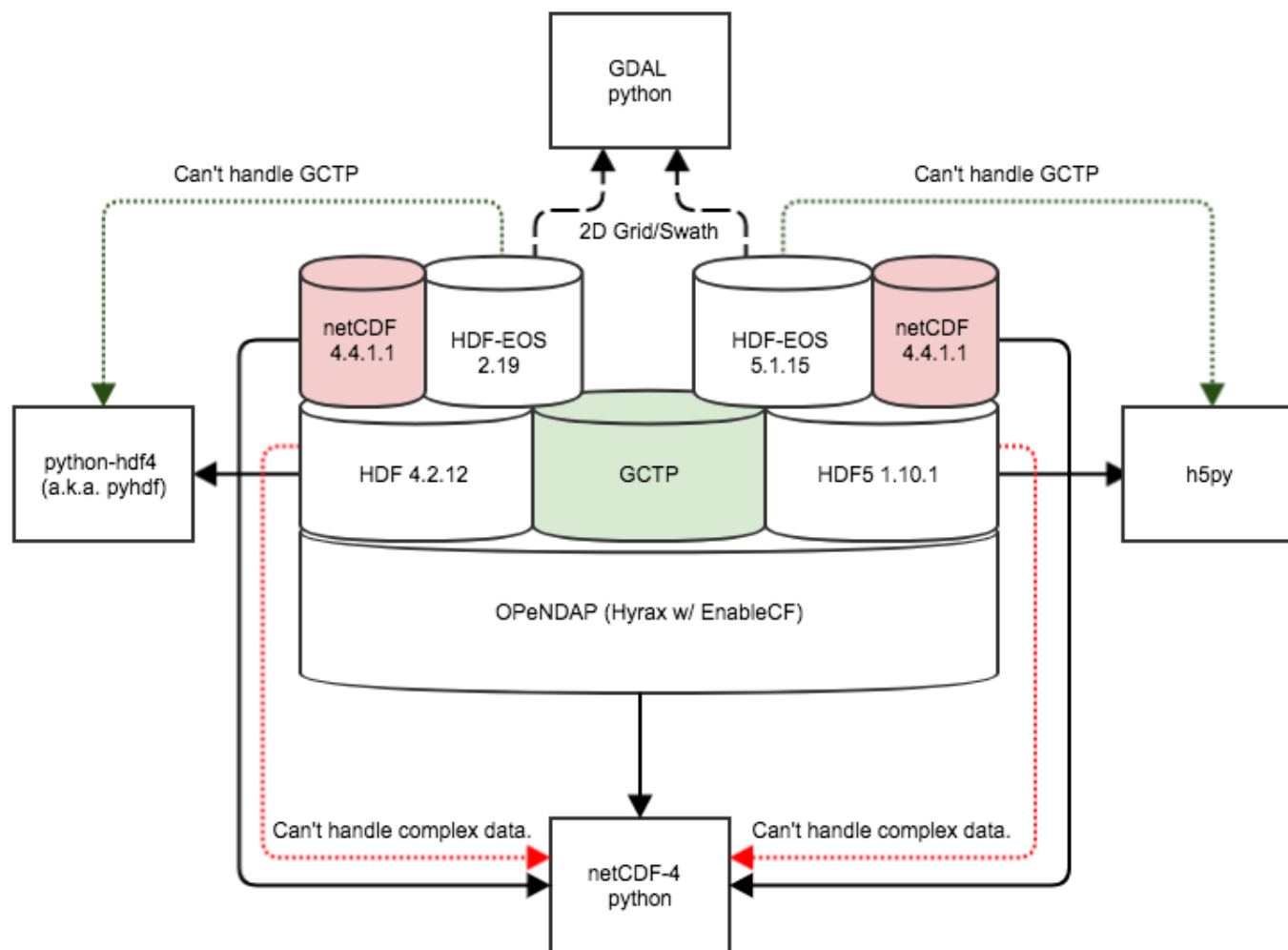
- List of NASA Data Centers
- List of NASA HDF Products

Click on any product!

# Pythonian tour has 4 packages

- pyhdf – for HDF4
- h5py – for HDF5
- netCDF4 – for HDF4/HDF5
- gdal – for HDF-EOS2/HDF-EOS5

# Why 4 packages?



# What to focus on during tour

- Does product have lat/lon dataset?
- If not, are they stored in different product or metadata or document?
- Bit packing / scale & offset handling
- Visualization tips on world map with different projections
- Memory / performance issue



# GESDISC AIRS Swath

- HDF-EOS2 – 2D Lat/Lon variables
- pyhdf / netCDF4
- Polar Stereographic plot

# GESDISC AIRS Grid

- HDF-EOS2 – 1D Lat/Lon variables
- pyhdf / netCDF4
- Equidistant Cylindrical plot

# GES DISC TRMM Swath v7

- HDF4 – pyhdf / netCDF4
- Lat/Lon in one 3D dataset - subsetting
- Longitude shifting for pcolormesh()

# GES DISC TRMM Grid

- Lat/Lon are calculated from documentation.

# GES DISC OMI Grid

- HDF-EOS5 - h5py (Python3)
- Lat/lon are calculated from StructMetadata

# GES DISC MLS Swath

- HDF-EOS5 / h5py
- netCDF-4 will not work due to object reference
- Vertical profile line plot –plot()
- Toolkit Internal Time (TAI) handling

# GES DISC HIRDLS ZA

- HDF-EOS5 - h5py / netCDF4
- Zonal Average plot - contourf()
- Log scale in Y-axis

# GES DISC GOSAT/ACOS

- HDF5 – h5py
- 1D lat/lon swath
- Trajectory - scatter()
- Multiple plots
- Orthographic projection map



# LAADS MOD06 Swath

- HDF-EOS2 – pyhdf / netCDF4
- Lat/Lon from MOD03 product
- Scale / offset / valid range
- S. Pole Stereographic projection

# LP DAAC MOD09GA Grid

- HDF-EOS2 – pyhdf / gdal
- Lat/Lon in Sinusoidal Projection

# MEaSURES VIP GRID

- HDF-EOS2 – pyhdf / netCDF4 / gdal
- StructMetadata parsing
- Huge dataset – sub sampling for visualization

# ASDC CALIPSO

- HDF4 – pyhdf / netCDF4
- Bitmask / Complex subsetting
- Discrete colorbar

# More Examples?

- NASA Developers Portal – PyDAP + PyCMR

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